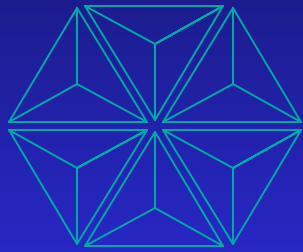


Vivarium Energy Conservation Project



**Bristol-Myers Squibb Company
Wallingford, Connecticut**

Labs21 Conference
October 7-9, 2002

Marc J. Estra, P.E.
Associate Director
Engineering & Maintenance



Bristol-Myers Squibb Company
Wallingford, CT

Presentation Outline

- Bristol-Myers Squibb Corporate Sustainability Goals
- BMS Energy Usage & Utility Data
- Project Goals
- Vivarium Facts and Figures
- Energy Savings
- Maintenance & Operation Savings
- Environmental Impact
- Project Features

Corporate EH&S Goals

2010 Sustainability Goals Summaries

Environmental Performance Targets...

...”the company will reduce its overall EHS impact by achieving improvements in several environmental indicators. They include reductions in air and water emissions energy, waste, and emissions of chemicals of concern. The company has set specific targets to be achieved, normalized to sales, by 2010”...

These goals are in line with the Laboratories for the 21st Century program.



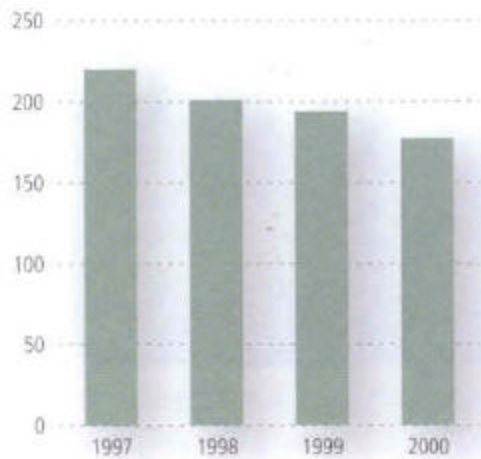
On the Path Toward Sustainability

2001 Sustainability Progress Report



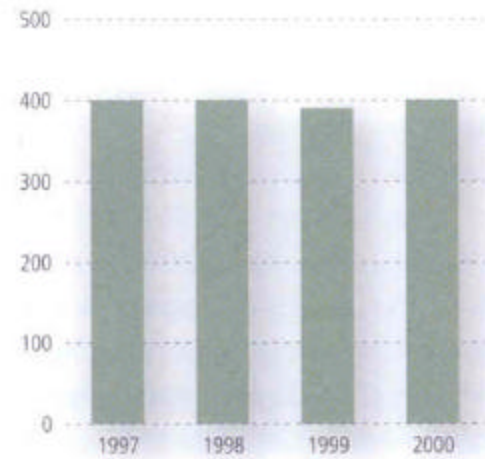
Bristol-Myers Squibb Company





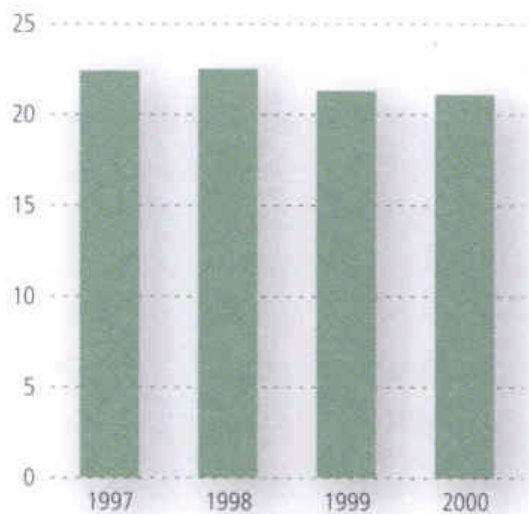
Electricity Use

Millions of joules per \$1000 worldwide sales



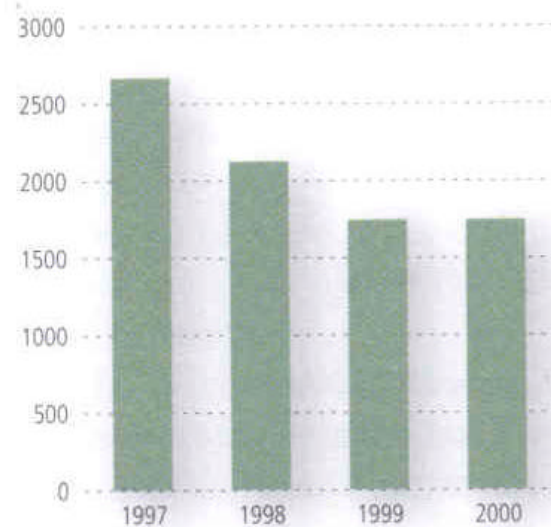
Fuel Consumption

Millions of joules per \$1000 worldwide sales



Greenhouse Gas (CO₂) Emissions

Kilograms per \$1000 worldwide sales



Water Use

Liters per \$1000 worldwide sales

Wallingford Utility Purchases 2001

Site Electrical	kWh	10,900,000	\$ 767,000
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Site Fuels	dTh	594,000	\$ 4,100,000
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Total	\$ 4,867,000
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Project Goals

- † Lower energy usage
- † Reduce maintenance
- † Improve operability
- † Reduce greenhouse gas emissions
- † Tighter room environmental control



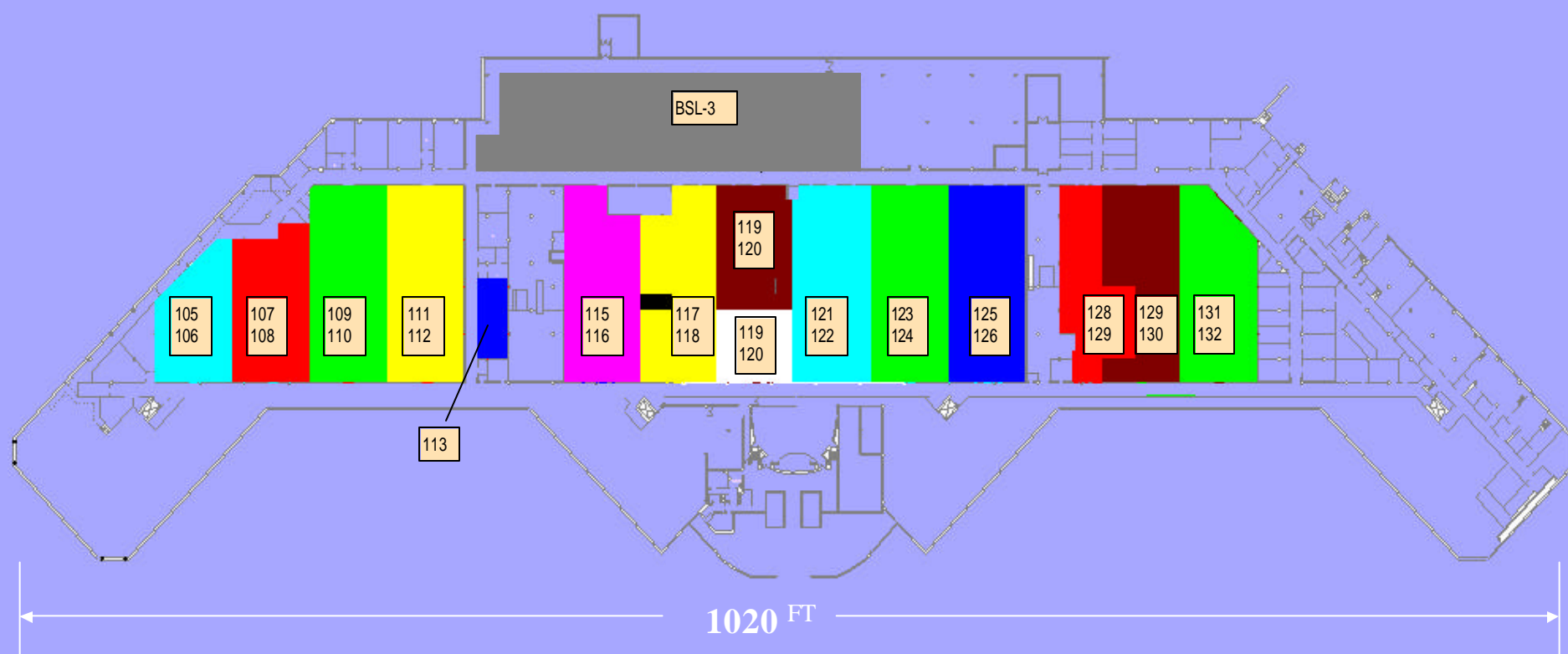
Typical Airflow Requirements

Type of Air Space	Type of Air Used	Typical Operations - Daytime/Off Hours	ACPH
OFFICE	Mixed outdoor & recirculated	5 x 10/off	4-6
LABORATORIES	100% outdoor	5 x 10/reduced flow	12-20
VIVARIUM	100% outdoor	24 x 7 x 365	15-25



Vivarium Menu

Facilities Main Menu



Wallingford Vivarium Floor Plan

BMS Wallingford Vivarium

- † 152 animal rooms
- † 140,000 GSF
- † Occupies 25 % of site space
- † Consumes 40 % of facility energy
- † Rooms are at 21 acph avg.
- † 25 - 35% rooms are unoccupied at any given time



Energy Savings



- † Lower air change rate to 15 acph (12 future)
- † Shutdown of 35-50 unoccupied rooms



Maintenance Savings

- † Room environmental alarm validation
- † Air flow calibration
- † Particle monitoring
- † Room fogging (decon.)
- † Species room changes



Improved Operability

- † Faster room changeovers
- † Room fogging (decon.)
- † Species room changes



Annual Savings



† HVAC	\$184,000
† Calibrations	\$ 11,000
† Maintenance	\$ 33,000
	<hr/>
Total	\$228,000
† Cost	\$1.1 MM
† Payback	5 years

Environmental Impact

† CO₂ reduction - 2745 Tons/yr

† NO_x reduction - 2 Tons/yr



Control System Features

- † Integrated into existing BAS (JCI)
- † Graphical user interface
- † Easier and less calibrations; easier troubleshooting
- † Remote and local access
- † Point and click room species and mode selection
- † Fan static pressure optimization

Sample BAS Screen Print

RM_132J
Item Edit View Action Go To Accessory Help

BMS Bristol Myers Squibb
VENT_LEV VENT_LEV
H131_132 HALLWAY 131 - 132
RM_132J ROOM 132J

Status	Item	Description	Value	Units
	SUP_TEMP	RM 132J SUPPLY TEMP	79	DEG F
	SPC_TEMP	RM 132J SPACE TEMP	74	DEG F
	TEMP_SET	RM 132J SPACE TEMP SETPT	74	DEG F
	ACPH	RM 132J CALC ACPH	18	ACPH
	ACPH_SET	RM AIRFLOW SETPOINT	18	ACPH
	DIFF	RM 132J DIFF PRESSURE	-0.02	IWC
	CFM_OFS	132J RM DIFF PRES OFFSET	-150	CFM
	ALM_MCO	ALARM REPORT LOCKING	OFF	
	RM_POS	POS/NEG DIFF STATUS ONLY	NEG	
	NEG_POS	NEG/POS COMMAND DX910	NEG	
	NEG_OFS	RM 132J CFM OFFSET VALUE	-150	CFM
	POS_OFS	RM 132J CFM OFFSET VALUE	160	CFM
	RM_MODE	RM 132J ROOM MODE	5.0	MODE
	RM_SET	APPLY RM MODE TO DX9100	NORMAL	
	STN_CUST	STAND OR CUST ENV CONFIG	STAND	
	CUS_TSET	RM 132J CUSTOM TEMP SETP	73	DEG F
	CUS_ASET	RM 132J CUSTOM ACPH SETP	18	ACPH
	SUP_CFM	RM 132J SUPPLY FLOW	548.2	CFM
	EXH_CFM	RM 132J EXHAUST FLOW	693	CFM
	RVLV_POS	RM 132J REHEAT VALVE POS	28.0	%
	EXH_POS	EXHAUST BOX VAV POSITION	26.6	%
	SUP_POS	SUPPLY BOX POSITION	20.2	%
	RM_VOL	RM 132J VOLUME	2334.0	CU-FT
	TEMP1	TEMP VAR	5	DEG F
	TEMP2	TEMP VAR	18	ACPH
	TEMP3	TEMP VAR	18	ACPH



Facilities Main Menu

A-Wing

B-Wing

C-Wing

D-Wing

AB-Node

BC-Node

CD-Node

EF-Node

F-Wing

Vivarium

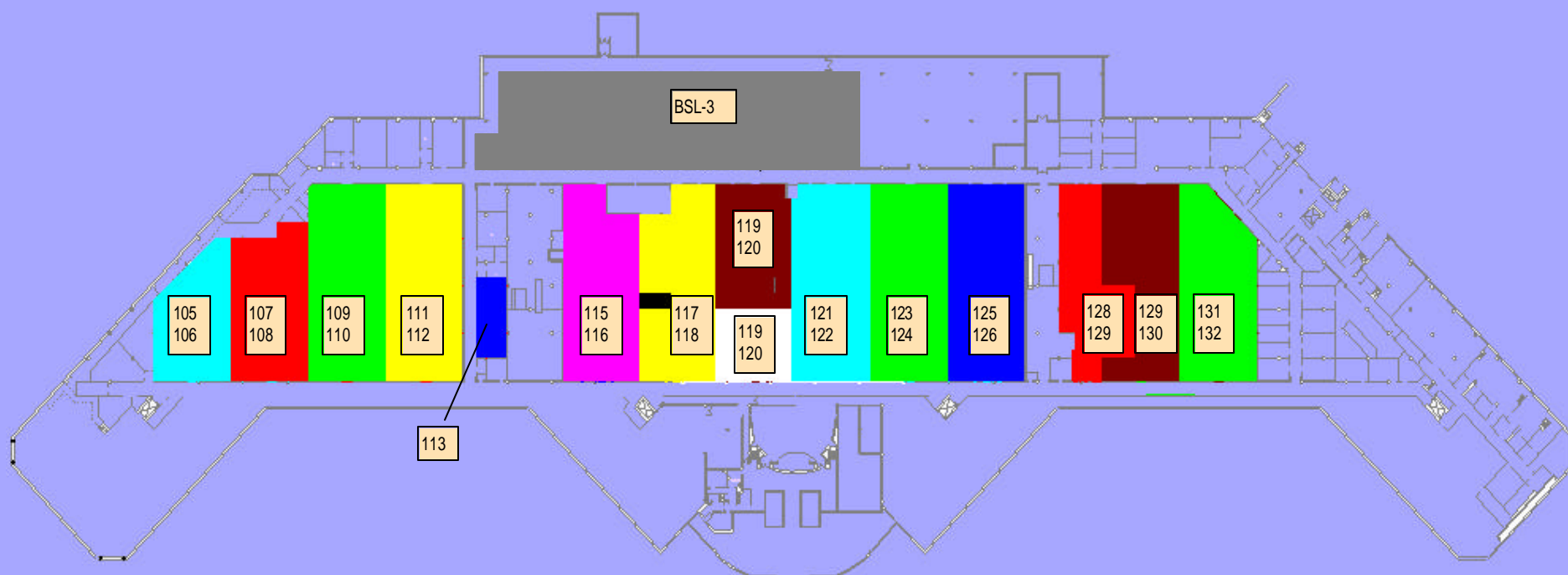
Child Development Center

Material Handling Building



Vivarium Menu

Facilities Main Menu





Hallway 131 - 132

Facilities Main Menu

Vivarium Menu

Room 132-J

Room 131-G

Room 131-F

Room 131-E

Room 131-D

Room 131-C

Room 131-B

Room 131-A

Room 132-F

Room 132-E

Room 132-D

Room 132-C

Room 132-B

Room 132-A



Bristol-Myers Squibb Company

Vivarium DDC Room 131-A

06/14/2002 2:57:56 PM

D-Wing AH-1 Fan System:

Discharge Temperature: 61.6

5.7

EF-1 Fan Static Pressure

D-Wing EF1/2 Fan System

Duct Humidity: 86.6

5.9

EF-2 Fan Static Pressure

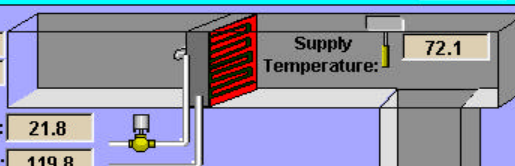
Fan Static Pressure: 4.3

ON

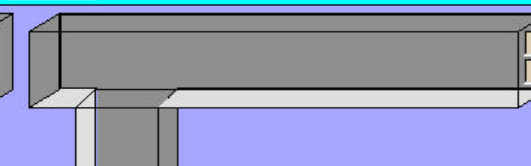
EF1/2 Exhaust Fan Start/Stop

Supply Box
VAV Position: 26.0
Airflow CFM: 687.0

Reheat Valve Position: 21.8
Reheat H2O Temperature: 119.8



Supply Temperature: 72.1



Exhaust Box
VAV Position: 87.4
Airflow CFM: 685.5

Facilities Main Menu

Vivarium Menu

Hallway 131-132



Supply Temperature: 72.1



Space Temperature: 72.0

Space Temperature Setpoint: 72.0

Air Changes per Hour: 17.8

Air Change per Hour Setpoint: 18.0

Differential Pressure: -0.02

Exhaust CFM Offset Setpoint: -85.0

Room Pressure Status: Positive

Room Volume: 2310.00



Outdoor Air Temperature: 64.8

Outdoor Air Humidity: 0.0



Outdoor Air Dewpoint: 0.0

Room Occupancy Mode

Cat / Dog

Room Pressurization

Neg

Standard / Custom

STN

Apply



Custom Temperature Setpoint: 72.0

Custom Airflow Setpoint: 16.00

Positive CFM Offset: 85.0

Negative CFM Offset: -85.00

Thank You!

Any Questions?